

New Distributional Records for Rare and Uncommon Odonata in Virginia

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Virginia contains one of the most diverse Odonata faunas in North America when compared to other states and the various Canadian provinces. A total of 130 dragonflies and 54 damselflies have been documented in the state (Carle, 1982, 1991; Roble, 1994, 1995; Roble & Stevenson, 1996). In this paper we provide noteworthy new distributional records for selected rare and uncommon species found in the state based primarily on surveys conducted since 1991 by the zoological staff of the Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH). These records are intended to supplement those contained in Carle (1982, 1991) and Roble (1994). All of our records from Caroline County and some selected new records of rare or uncommon Odonata from other counties in the state were previously reported by Roble & Hobson (1996).

For the purposes of this paper, rare species are defined as Odonata that are currently monitored by DCR-DNH (Roble, 1996). These species are typically known from fewer than a dozen sites in the state, but most are not globally rare. Although Carle (1991) recommended that the Virginia Department of Agriculture and Consumer Services grant endangered or threatened status to 13 species of dragonflies (Anisoptera), no species of Odonata are currently afforded legal protection in Virginia. Most of the uncommon species discussed below are included on the DCR-DNH Watch List, which consists of species that are not currently believed to warrant conservation attention, but which are typically known (in the case of Odonata) from 15-25 sites in the state. We have also provided new data on adult flight periods for selected

species when they extend the previously known season of Virginia populations.

All of the following records are supported by voucher specimens unless noted otherwise. Collections by the authors are indicated by our respective initials. Collections by former DCR-DNH zoologists Kurt A. Buhlmann, Christopher A. Pague and Philip H. Stevenson, and contract zoologist (during May 1991) Tim E. Vogt are also indicated by their initials, as are reliable sight records reported to us by DCR-DNH botanist J. Christopher Ludwig. Mr. Vogt has also kindly permitted us to include the results of a very significant collection that he and R. Duncan Cuyler made on their own initiative on 1 October 1993. Finally, several other collectors have generously allowed us to include their unpublished records as discussed below. Most specimens obtained by the authors have been or will be deposited in the Virginia Museum of Natural History (VMNH, Martinsville). A few will be donated to the National Museum of Natural History (USNM, Smithsonian Institution, Washington, D.C.) or retained in the DCR-DNH reference collection. Specimens collected by Tim E. Vogt are deposited in the Illinois State Museum (Springfield).

Scientific names and authors of species discussed below follow Garrison (1991) except as noted by Roble (1994) and May (1995). The common names that are used herein follow those recently adopted by the Dragonfly Society of the Americas (1996). Several of these do not correspond with the common names used previously by Carle (1991).

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Rare Species

ZYGOPTERA

Calopteryx angustipennis (Selys). Appalachian Jewelwing

Roble (1994) claimed to provide the first published records of this species from Virginia (six counties), but the population discovered in Alleghany County by Richard L. Hoffman in 1951 had been mentioned very briefly by Opler (1979), who recommended it for "Special Concern" status. Neither of these authors was aware of the second oldest collection of *C. angustipennis* in the state. Thomas W. Donnelly (pers. comm.) discovered a population of this species along Passage Creek in Shenandoah County on 16 June 1958. He subsequently verified its continued existence at this site in 1969 and 1984. Surveys conducted by SMR on 7 June 1996 confirmed that this population is still extant.

Hetaerina titia (Drury). Smoky Rubyspot

Roble (1994) reported that *H. titia* and its more common congener *H. americana* (Fabricius), the American rubyspot, occur together along the Clinch, New and Nottoway rivers in Virginia. The following two sites, which were discovered by SMR and CSH on 6 September 1995, also support both species: Lee Co.: Powell River at State Route 70, 3 km S Jonesville; Scott Co.: North Fork Holston River at U.S. Route 58/421, 1 km SE Hilton. Both of these rivers have been impacted by industrial pollution in the past (Ahlstedt, 1991; Wolcott & Neves, 1994). A recent spill (24 October 1996) from a coal waste holding pond entered a tributary of the Powell River and transported coal fines downstream into the North Fork and mainstem of the river for up to 100 km to beyond the Virginia-Tennessee border (L. Koch, U.S. Fish and Wildlife Service, pers. comm.; Silverman, 1997).

Roble (1994) overlooked a specimen of *H. titia* collected by CAP on 11 September 1991 along the Appomattox River in Amelia County. The site that he alluded to along the Nottoway River where this species had been taken by Frank L. Carle is near the County Route 653 bridge in Southampton County (F. L. Carle, pers. comm.). Both of these are previously unpublished county records for Virginia.

Enallagma pallidum Root. Pale Bluet

Roble (1994) noted that this was the only species of damselfly known from Virginia which had not been verified in the state during the preceding 25 years. He reported that the only previous collection of *E. pallidum* was made on 26 June 1938 along the Feeder Ditch to Lake Drummond. This species was reconfirmed at Lake

Drummond (City of Chesapeake) by CSH on 18 June 1996 (one male collected and another observed). Furthermore, on 11 July 1996, CSH and Doug Stannard discovered a large population of *E. pallidum* (about 175 adults observed during an abbreviated survey; 3 males collected) along Indian Creek adjacent to Northwest River Park in the City of Chesapeake, approximately 25 km SE of the Lake Drummond site.

ANISOPTERA

Aeshna mutata Hagen. Spatterdock Darner

Carle (1991) recommended this species for state endangered status because it was known from only three sites in Virginia (one each in Augusta, Craig and Highland counties). However, he failed to mention Hoffman's (1987) report of this species from Potts Pond along the Alleghany-Craig county line (which may not represent a breeding site). Division of Natural Heritage surveys have documented breeding populations of *A. mutata* at two additional sites in Augusta County (Laurel Run ponds, TEV, 1991; Loves Run Ponds, SMR, 1995). A single adult was also observed by SMR at another site in Highland County. Carle (1991) stated that the documented flight period of this species in Virginia extended from 30 May to 13 June. The records of SMR and TEV range from 25 May to 20 June.

Aeshna tuberculifera Walker. Black-tipped Darner

Carle (1982) recorded this northern species from six counties confined to western Virginia, his southernmost locality being in Russell County. Halverson (1983) added Rockingham County to the Virginia distribution of this species, indicating that it was common at his study ponds. SMR and CSH found *A. tuberculifera* to be common on 22-23 September 1993 in a beaver meadow on the Jefferson National Forest, approximately 10 km SE Norton in Scott County. It was found in association with the equally abundant *A. umbrosa* Walker (shadow darner). This record extends the range of *A. tuberculifera* one county further to the southwest in Virginia. This species reaches the southern limits of its range in western North Carolina (Cuyler, 1984).

Gomphus abbreviatus Hagen in Selys. Spine-crowned Clubtail

Carle (1982) recorded this species from six sites in five western Virginia counties, and predicted that it would eventually be found in the Piedmont region of the state. His flight dates ranged from 1 May to 6 June. On 23 May 1995, SMR discovered a population (3 males collected) along the Nottoway River at State Route 49 (Nottoway

Falls) on the Lunenburg-Nottoway county line, constituting the first record of this species in southeastern Virginia. On 22 April 1996, CSH collected a teneral female along the Nottoway River at the Chub Sandhill Natural Area Preserve (County Route 631, ca. 22 km SW Wakefield) in Sussex County. The latter site is in the Coastal Plain approximately 88 air km ESE of Nottoway Falls, and upwards of 150 river km downstream from there. Cuyler (1984) had previously documented this species in northcentral North Carolina. Both Needham & Westfall (1955) and Carle (1982) listed a 27 April record from South Carolina as the earliest known flight date for this species, but White et al. (1980) reported that an adult *G. abbreviatus* was taken on 17 April 1932 in that state.

Gomphus parvidens Currie. Piedmont Clubtail

Carle (1991) recommended this species for state threatened status because only two localities were known in Virginia (one each in Bedford and Charlotte counties). He indicated that the known flight period in the state extended from 23 May to 10 June. On 24 April 1990, CAP and Michael L. Lipford collected a teneral female along Fine Creek at County Route 711 (Fine Creek Mills) in Powhatan County. Carle (1991) and Tennessen et al. (1995) listed 29 April and 1 May as the earliest known dates for North Carolina and Alabama, respectively. White et al. (1980) listed a 5 April record from South Carolina for *G. carolinus* Carle, which is considered a junior synonym of *G. parvidens* by some authorities

Gomphus quadricolor Walsh. Rapids Clubtail

Carle (1982) recorded this species with certainty from only two sites in Alleghany and Botetourt counties in western Virginia (plus a tentative record from Montgomery Co.), but remarked that it is probably much more common in the state. The capture dates of the two records available to him were 18 May and 29 May. CAP collected one adult of this species in 1990 in extreme northern Highland County, although details of this record are unknown to the authors (specimen not seen). The USNM contains an adult male captured by O. S. Flint, Jr. on 9-10 July 1982 along the Hazel River near Boston (Culpeper Co.) in the Northern Piedmont region of Virginia.

Gomphus viridifrons Hine. Green-faced Clubtail

Carle (1991) recommended this species for state threatened status because only three localities were known in Virginia (one each in Botetourt, Floyd and Grayson counties). Carle (1982) stated that the flight period of this species in Virginia extends from 21 May (erroneously reported as 24 May in Carle, 1991) to 3 June. On 7 June 1995, CSH collected a male along the Pound River, 1.7

km N Pound in Wise County. A female was captured on 12 July 1995 by CSH and DJS along the Pound River, 0.5 km upstream of its confluence with the Russell Fork River in Dickenson County. These sites are separated by approximately 28 air km. The Pound River is impounded 1.5 km upstream of the latter collection site, forming the John W. Flannagan Reservoir. This river has also been degraded by the effects of strip mining (Jenkins & Burkhead, 1994).

Lanthus parvulus (Selys). Northern Pygmy Clubtail

Carle (1991) recommended this species for state threatened status because only two localities were known in Virginia (one each in Highland and Montgomery counties). Two additional sites were documented by CAP in Highland and Page counties during 1991 (DCR-DNH database; specimens not seen by authors).

Lanthus vernalis Carle. Southern Pygmy Clubtail

Carle (1980, 1982) recorded this species from 12 counties in western Virginia, with flight dates ranging from 13 May to 14 July. Our surveys have documented *L. vernalis* at the following additional sites: Bath Co.: Bubbling Springs, George Washington National Forest, 8 May 1995, SMR and Michael W. Donahue; Montgomery Co.: hillside seepage along County Route 641, 3.5 km NW Montgomery, 10 May 1994, SMR (teneral); Russell Co.: 3.3 km NE South Clinchfield, 14 June 1996, SMR (sight record believed to be this species rather than *L. parvulus*). The latter two constitute new county records.

Ophiogomphus alleghaniensis Carle. Allegheny Snaketail

Carle (1982, 1991) reported that this species was known in Virginia only from nymphal collections made at one site in Giles County that was threatened by habitat alteration. Consequently, he recommended that it be granted state endangered status (Carle, 1991). Terwilliger & Tate (1995) listed its status in Virginia as probably extirpated. Fortunately, another Virginia population was recently discovered by Tim E. Vogt and R. Duncan Cuyler, who collected a single nymph on 1 October 1993 from the Little River in Floyd County (T. E. Vogt, pers. comm.). The specimen was successfully reared to maturity and the adult that emerged was identified by Kenneth J. Tennessen (T. E. Vogt, pers. comm.). This collection site also supports the only known Virginia population of the globally rare mountain river cruiser, *Macromia margarita* Westfall (Carle, 1991).

Ophiogomphus howei (Bromley). Pygmy Snaketail

This rarely collected species was originally discovered in Virginia by Kennedy & White (1979), who described

the nymph based on material collected in the New River. Opler (1979) proposed that its status in Virginia be listed as special concern, whereas Carle (1991) recommended *O. howei* for state endangered status. Carle (1982, 1991) knew of only two collection sites along the New River in Virginia (one each in Carroll and Grayson counties), although he found more than 700 exuviae on a single date at the latter site. In May of 1992, KAB and Judy Jacobs (U.S. Fish and Wildlife Service) collected exuviae of *O. howei* (all identifications by Clark N. Shiffer) at nine bridge crossing sites along the river extending from the U.S. Route 21/221 bridge near the North Carolina-Virginia border downstream (north) to Ivanhoe in Wythe County (Buhlmann, 1992). Subsequently, Tim E. Vogt and R. Duncan Cuyler collected 10 nymphs (two reared to adult) from the Little River site in Floyd County where the preceding species was taken (T. E. Vogt, pers. comm.). Their collections (all made on 1 October 1993) also documented the presence of *O. aspersus* Morse, the brook snaketail, and *O. rupinsulensis* (Walsh), the rusty snaketail, making it one of very few sites in North America where four members of this genus occur syntopically (T. E. Vogt, pers. comm.). Carle (1982) had previously recorded only *O. aspersus* at this site.

Stenogomphurus consanguis (Selys). Cherokee Clubtail

Carle (1991) reported that this rarely collected species reaches the northern limit of its restricted global distribution in extreme southwestern Virginia, where it was known from a total of two sites in Scott and Washington counties, respectively. He recommended that it be designated a state endangered species and speculated that many populations had been lost within its limited range in the southern Appalachians due to factors such as the creation of impoundments and water quality degradation. Surveys by DJS in June of 1995 resulted in the discovery of *S. consanguis* at five additional sites in Scott County and two new sites in Washington County. Several specimens that he collected on 16 June extend the Virginia flight period one day past that listed in Carle (1991). The range of this species was extended north into Russell County by SMR in 1996, when he documented a population near the Clinch River north of Lebanon. Our status survey for this species will continue through at least the 1997 field season, after which time a more complete account of its distribution in Virginia will be prepared.

Stenogomphurus rogersi (Gloyd). Sable Clubtail

Carle (1982) reported this rarely collected species from two sites in southwestern Virginia (both in Washington County), as well as one site in northeastern Virginia (Spotsylvania County). Donnelly (1994) and Flint (1996)

recently reported (as *Gomphus rogersi*) that a single female specimen was taken in a Malaise trap in Essex County. During the June 1996 status survey for *S. consanguis*, SMR documented populations of *S. rogersi* at the following new sites: Smyth Co.: Carlock Creek, 7.5 km SE Saltville (7 males); Washington Co.: unnamed tributary to South Fork Holston River, 1.5 km SE Lodi (1 male). Three additional populations of *S. rogersi* were discovered by Frank L. Carle in 1995 in southwestern Virginia (F. L. Carle, pers. comm.), bringing the total number of documented sites in the state to nine.

Stylurus scudderi (Selys). Zebra Clubtail

Carle (1982) knew of only one record for this species in Virginia, from an unspecified locality in Roanoke County. John Michalski (pers. comm.) collected one emerging male on 13 July 1988 along the east bank of the New River downstream of the U.S. Route 58/221 bridge, 9.5 km E Independence in Grayson County. Numerous emerging *S. spiniceps* (Walsh), the arrow clubtail, were also collected at this site on that date. DCR-DNH biologists have not encountered this species in Virginia.

Cordulegaster diastatops (Selys). Delta-spotted Spiketail

Carle (1983) recognized that this name applied to two sibling species and described *Zoraena* (treated as a subgenus of *Cordulegaster* by most authors) *bilineata*, the brown spiketail, which applied to the more southern form. The only valid Virginia record of *C. diastatops* was thus restricted to an adult male specimen that he collected on 4 June 1977 at a site in Highland County that harbors many northern species of Odonata at or near the southern limits of their ranges (Carle, 1982, 1983). The second Virginia specimen (adult female) of *C. diastatops* was captured by CSH on 23 May 1995 on the Wallops Flight Facility, 2.2 km NE Wattsville in Accomack County on the Delmarva Peninsula. This record was quite unexpected because this species has been documented in Maryland only in the extreme western part of the state (R. L. Orr, pers. comm.) and it is apparently unrecorded in Delaware (Carle, 1983; H. B. White, pers. comm.). May & Carle (1996) reported this species from nine counties in New Jersey, including the southernmost two (Cumberland and Cape May).

The Accomack County site is a forested seepage wetland containing shallow water in a dendritic branching pattern, with mucky seepage pools and a silty, sand-bottomed stream. This habitat also supports populations of the uncommon damselflies *Amphiagrion saucium* (Burmeister), the eastern red damsel, and *Ischnura prognata* (Hagen), the furtive forktail.

Cordulia shurtleffi Scudder. American Emerald

Carle (1982) recorded this northern species from three sites in Bath and Highland counties in western Virginia. Halverson (1983) indicated that it was common at his study ponds in Rockingham County. Surveys by TEV on 25 May 1991 documented the first records of *C. shurtleffi* from Augusta County. It has subsequently been found by SMR at two sites on the George Washington National Forest in this same county. The earliest Virginia flight date listed in Carle (1982) was 10 June.

Epitheca costalis (Selys). Stripe-winged Baskettail

Carle (1982, 1991) stated that this species (reported as *Tetragoneuria costalis*) was known from only three sites in Virginia, namely Great Falls (Fairfax County), the Great Dismal Swamp (City of Suffolk) and Seashore State Park (City of Virginia Beach). A second locality in the City of Virginia Beach was confirmed on 21 May 1991 when TEV collected this species at Black Gut, 0.4 km W Sandbridge.

Tramea onusta Hagen. Red-mantled Saddlebags

Carle (1982) recorded this species only from Charles City and Montgomery counties in Virginia, with flight dates ranging from 20 May to 12 June. As noted previously by Roble & Hobson (1996), Carle determined that Matta's (1978) records for this species from southeastern Virginia were based on misidentified specimens of *T. carolina* (Linnaeus), the Carolina saddlebags. On 2 July 1991, CAP collected a male at Green Pond, Big Levels Wildlife Management Area on the George Washington National Forest in Augusta County.

Uncommon Species

ZYGOPTERA

Archilestes grandis (Rambur). Great Spreadwing

Roble (1994) knew of only four county records for this species in Virginia. Two new county records are now available. An adult was observed but not collected in the fall of 1996 by CSH in Henrico County west of the City of Richmond corporate limits. Michael W. Donahue collected an adult male *A. grandis* in the Kelly Flats area of the Jefferson National Forest in Giles County on 30 October 1996 (specimen in VMNH), which also represents a new late flight date for this species in Virginia.

Lestes congener Hagen. Spotted Spreadwing*Lestes eurinus* Say. Amber-winged Spreadwing

Roble (1994) reported these uncommon species from seven and eight counties, respectively, in Virginia. In each case, all but one of the confirmed counties lies in the

western portion of the state. Flint (1996) added records of *L. congener* from Clarke County. Both of these species were collected on 11 July 1995 by CSH and DJS at Mullins Pond on Pine Mountain, Jefferson National Forest in Dickenson County (new county records). The aurora damsel, *Chromagrion conditum* (Hagen), and *Amphiagrion saucium*, two other locally distributed damselfly species that had previously been documented in this county (Roble, 1994) were also present at this pond.

Lestes forcipatus Rambur. Sweetflag Spreadwing

A population discovered in Bath County on 14 July 1995 by SMR is an addition to the county records listed in Roble (1994).

Lestes inaequalis Walsh. Elegant Spreadwing

A sight record obtained on 2 June 1994 by CSH in York County was omitted by Roble (1994) from the list of cities and counties with confirmed records.

Amphiagrion saucium (Burmeister). Eastern Red Damsel

Recent additions to the county records listed in Roble (1994) and Flint (1996) are Accomack (CSH), Frederick (SMR), Floyd (SMR), Lee (CSH), Shenandoah (SMR) and Smyth (DJS).

Ischnura prognata (Hagen). Furtive Forktail

Stevenson et al. (1995) demonstrated that this species was more common in Virginia than had been suggested by Roble (1994), who knew of only one historical and one recent record. They found *I. prognata* at seven new sites during 1995 alone. Flint (1996) reported specimens taken during Malaise trapping in Essex County. Our surveys in 1996 documented this species at the following new sites: Greensville Co.: 2 km NNE Claresville, 8 August 1996, SMR; Sussex Co.: Chub Sandhill Natural Area Preserve, 22 April 1996, CSH, SMR and DJS; City of Suffolk: property adjacent to Suffolk Regional landfill, north of U.S. Route 58, 9 May 1996, CSH; Great Dismal Swamp National Wildlife Refuge, Jericho Ditch jct. with Lynn Ditch, 22 May 1996, CSH (sight record); City of Chesapeake: North Landing River Preserve (The Nature Conservancy), 29 May 1996, CSH. Our April collection constitutes a new early flight date for this species in Virginia.

ANISOPTERA

Tachopteryx thoreyi (Hagen). Gray Petaltail

Carle (1982) recorded this large, primitive dragonfly from 13 Virginia counties, with flight dates ranging from

22 May to 3 August. Roble & Hobson (1996) documented it at four sites in Caroline County and Flint (1996) added a record for Essex County. The following constitute new county records: Dickenson Co.: four sites on the Jefferson National Forest (Dutten Gap, Maynard Ridge, Mullins Pond and Skegg Branch), 9 June-12 July 1995, CSH and DJS (voucher specimens collected at two sites); Lee Co.: southwest of Falling Water Gap near the Kentucky state line, 9 August 1995, JCL (sight records); Lunenburg-Nottoway Co. line: Nottoway Falls, 23-26 May 1995, SMR and DJS; Northumberland Co.: Bushmill Stream Natural Area Preserve, 9 May 1996 (nymph), SMR; Page Co.: 11 km west of Luray, 14 July 1979, G. F. Hevel (USNM); Shenandoah Co.: Powells Fort Camp, George Washington National Forest, 7 June 1996, SMR; Wise Co.: Jefferson National Forest near Pine Mountain Tunnel, 10 June 1995, CSH and William H. Moorhead (sight record).

The nymph that was collected in Northumberland County has been kept alive for nearly a year. It has been housed in a small, covered plastic bowl containing a few decaying, deciduous leaves and approximately 5 mm of water (room temperature with no aeration) and fed only occasionally (mostly wood roaches). The hardiness and semi-terrestrial nature of this specimen, which continues to grow despite minimal care, is remarkable for an aquatic insect. Dunkle (1981) observed that captive larvae preferred to remain in water when young, but chose a mud substrate over water at an older age. In the wild, larvae live between or under leaves near the upper edge of seepage areas (Dunkle, 1981).

Boyeria grafiana Williamson. Ocellated Darner

Carle (1982) reported this species from 18 sites in 13 counties in western Virginia. New county records are: Scott Co.: Staunton Creek at County Route 653, 21 September 1993, SMR and CSH; Smyth Co.: Big Tumbling Creek, Clinch Mountain Wildlife Management Area, 19 August 1992, SMR.

Gomphaeschna furcillata (Say). Harlequin Darner

Roble & Hobson (1996) recorded this early spring species from Caroline County and noted that it was considerably more common in Virginia than suggested by the records in Carle (1982). Flint (1996) reported this species from Essex County. New county records that we have documented are from Augusta (SMR), Fairfax (CSH) and York (DJS). Matta (1978) recorded *G. furcillata* from the City of Suffolk, although Carle (1982) did not include these records in his compilation. On 17 April 1996, SMR and DJS observed this species in abundance along Lynn and Washington ditches in the Great Dismal

Swamp National Wildlife Refuge (City of Suffolk). Division of Natural Heritage zoologists have also documented several populations of *G. furcillata* in the City of Virginia Beach at sites other than those listed in Carle (1982). Carle (1982) stated that the flight season in Virginia ranged from 8 April to 25 May. Our latest record was obtained on 31 May.

Erpetogomphus designatus Hagen in Selys. Eastern Ringtail

Carle (1982) reported this species from 10 counties in Virginia. Several adults were captured by SMR and DJS on 23 August 1995 along the South Fork Shenandoah River near Limeton in Warren County at the site of the newly created Shenandoah River/Andrew Guest State Park. This species was also recorded along the North Fork Shenandoah River at Strasburg in Shenandoah County on 2 July 1977 (T. W. Donnelly, pers. comm.). These are the first records of *E. designatus* from the Shenandoah Valley. This species was also observed by SMR along the Hazel River in Culpeper County (county record). A specimen observed in a Richmond (city) office building on 8 June 1995 and captured the following day (DJS) constitutes a newly early flight date for the state.

Gomphus lineatifrons Calvert. Splendid Clubtail

Carle (1982) recorded this species from 11 counties in western Virginia, with flight dates ranging from 21 May to 27 June. New county records that we have documented in the extreme southwestern corner of the state are: Dickenson Co.: Pound River at site of *G. viridifrons* locality discussed above, 12 July 1995 (DJS, sight record); Scott Co.: Copper Creek at State Route 71, 11 June 1995 (CSH and W. H. Moorhead); Washington Co., Smith Creek, 14 June 1995 (DJS); Wise Co.: Pound Reservoir, 14 July 1995 (CSH and DJS, sight record).

Gomphus vastus Walsh. Cobra Clubtail

Carle (1982) recorded this species from 10 counties in central and western Virginia. Louton (1982) added a record from Scott County. During June of 1995, DJS also documented this species in Scott County when he found it at two sites (Cove Creek and an unnamed tributary of Copper Creek).

On 28 May 1993, CSH collected an adult female at Big Pond along the Appalachian Trail in Giles County, although this individual was probably a vagrant.

Hagenius brevistylus Selys. Dragonhunter

Carle (1982) recorded this large gomphid from 16 counties in Virginia, with flight dates ranging from 27 May to 2 September. Roble & Hobson (1996) reported it from Caroline County. Additional DCR-DNH surveys

have nearly doubled the number of counties from which *H. brevistylus* has been documented in Virginia, revealing that this species is relatively common in the state. These new county records are: Albemarle Co.: James River (CSH, sight record); Appomattox Co.: Appomattox River (SMR); Brunswick-Dinwiddie Co. line: Nottoway River (CSH and SMR); Carroll Co.: Big Reed Island Creek (SMR); Grayson Co.: New River (SMR et al.); Greensville Co.: Fontaine (= Fountains) Creek (KAB and CAP); Highland Co.: Bullpasture River (SMR, sight record); Isle of Wight Co.: Blackwater River (SMR, sight record); Lunenburg-Nottoway Co. line: Nottoway Falls (SMR and DJS) and County Route 627 bridge (PHS); Lee Co.: Powell River and vicinity (SMR and CSH, sight records) and Indian Creek (SMR, larvae); Nottoway Co.: Little Nottoway River (PHS); Patrick Co.: Dan River (SMR and CSH, sight records); Shenandoah Co.: Passage Creek (SMR; first recorded here in 1958 by Thomas W. Donnelly); Sussex Co.: Nottoway River (PHS). Our latest record for this species is 6 September.

Progomphus obscurus (Rambur). Common Sanddragon

Carle (1982) reported this species from approximately 20 sites in 12 scattered counties in Virginia. Roble & Hobson (1996) added records from Caroline County. Additional county records documented during DNH surveys are: Chesterfield Co.: Swift Creek, Pocahontas State Park (SMR and CSH); Dickenson Co.: Russell Fork River (CSH); Isle of Wight-Southampton Co. line: Blackwater River (SMR); Lunenburg-Nottoway Co. line: Nottoway Falls (SMR and DJS); Prince William Co.: South Fork Quantico Creek, Prince William Forest Park (PHS). The USNM also contains a male collected recently in Prince William Forest Park.

Stylogomphus albistylus (Hagen in Selys). Least Clubtail

Carle (1982) reported this species from 14 counties in western Virginia, extending as far west as Washington County. New county records that we have documented in the southwestern corner of the state are: Bland Co.: Little Wolf Creek (CSH); Dickenson Co.: Pound River (DJS and CSH) and Upper Twin Branch (CSH and DJS); Scott Co.: Cove Creek (DJS). Jerry A. Louton (pers. comm.) previously collected nymphs of this species in Copper Creek, Scott County, but this record does not appear on the county range map in Louton (1982). In June of 1995, DJS recorded *S. albistylus* at three additional sites in Washington County. Thomas W. Donnelly (pers. comm.) documented *S. albistylus* along Passage Creek in Shenandoah County on 17 June 1969, which is another county record. We have also found this species at additional sites in several of the counties listed in Carle

(1982), indicating that it is relatively common in Virginia.

Stylurus spiniceps (Walsh). Arrow Clubtail

Carle (1982) reported this species from eight counties in Virginia, with flight dates ranging from 19 June to 4 September. New county records documented during DNH surveys are: Albemarle Co.: Mechums River near Owensville, 18 October 1993, SMR and CSH; Lee Co.: Powell River at Route 833, 4 September 1995, CSH and SMR; Northampton Co.: Hog Island, 11 July 1990, CAP. SMR and CSH have also found this species at sites along the Hazel River (Culpeper Co.) and Little River (Floyd Co.) other than those listed in Carle (1982). Our October record not only represents a new late date for Virginia, but it is apparently the latest published record for *S. spiniceps* rangewide. The latest date known to Needham & Westfall (1955) was 5 October, whereas Carle (1982) listed a 12 October record from Pennsylvania.

Cordulegaster erronea Hagen in Selys. Tiger Spiketail

Roble & Hobson (1996) remarked that this species is more common in Virginia than previously believed, and added Caroline and York counties to the records listed in Carle (1982). Additional new county records are from the following localities: Dickenson Co.: Headwaters of Little Fork, Dutton Gap on the Jefferson National Forest, 11 July 1995, DJS and CSH; Breaks Interstate Park, 29 June 1991, John M. Anderson (VNMH); Floyd Co.: Buffalo Mountain, 17 July 1993, JCL (sight record). The former site is also inhabited by *Tachopteryx thoreyi*. The latter site was recently purchased by the Virginia Department of Conservation and Recreation and added to the state natural area preserve system. The USNM contains a female specimen collected by Nancy E. Adams on 13 August 1993 in Prince William Forest Park, Prince William County, which also constitutes a new county record.

Macromia taeniolata Rambur. Royal River Cruiser

Carle (1982) recorded this large species from ten counties in Virginia. A new county record was documented on 1 September 1992 when KAB collected an adult female near the Blackwater Ecologic Preserve, 6 km SSW Zuni, Isle of Wight County.

Neurocordulia obsoleta (Say). UMBER Shadowdragon

This crepuscular species is undoubtedly more common in Virginia than previous records (6 sites in 6 counties, Carle, 1982) indicate, owing to the difficulty of observing and capturing rapidly flying adults at twilight. The following are new county records: Isle of Wight Co.: Blackwater River at County Route 614 bridge, 1 km W

Zuni, 26 May 1995, CSH; Blackwater River at Antioch Pines Natural Area Preserve, 5 km SSW Zuni, 21 May 1996, SMR and Richard L. Hoffman; Lunenburg-Nottoway Co. line: Nottoway Falls, 23 May 1995 (SMR) and 26 May 1995 (SMR and DJS). One of the specimens collected at the Antioch site was captured shortly after dark when it was attracted to a blacklight that was operating on a high bank above the river. This species was most common at the Nottoway Falls site, where approximately 50 patrolling males were observed before dusk on 26 May 1995. Three days earlier, a mated pair was collected on a shaded rock boulder bordering the river at 1945 h, nearly an hour before dusk. The earliest Virginia flight date listed in Carle (1982) was 2 June.

Somatochlora linearis (Hagen). Mocha Emerald

Carle (1982) recorded this species from nine scattered counties in Virginia, ranging as far west as Montgomery County. Roble & Hobson (1996) reported *S. linearis* from Caroline County based on sight records. We have also documented it in the following new counties: Chesterfield (SMR), Scott (SMR) and Surry (SMR). The single male specimen from Scott County, which was collected in a high elevation (835 m) headwater stream above Bark Camp Lake, is blackish and approximately 15% smaller than several coppery specimens captured in a blackwater swamp in Surry County.

Brachymesia gravida (Calvert). Four-spotted Pennant

Carle (1982) recorded this species only from Lancaster County and the City of Virginia Beach. Our surveys have revealed that it is more common and widespread in coastal areas of Virginia. New city and county records are: Accomack Co.: Wallops Island (DJS and CSH, specimen destroyed); Fairfax Co.: Fort Belvoir Military Reservation (CSH, sight record); Northampton Co.: Hog Island (KAB); Northumberland Co.: Hughlett Point Natural Area Preserve (SMR); York Co.: Camp Peary Military Reservation (SMR and CSH, sight record); City of Chesapeake: Northwest River (JCL and CSH, sight records); City of Newport News: Fort Eustis Military Reservation, (DJS and SMR, sight records). Additional populations have also been documented by several DNH biologists in Virginia Beach.

Celithemis fasciata Kirby. Banded Pennant

Roble & Hobson (1996) added Caroline County to the 11 Virginia counties listed by Carle (1982). Additional city and county records documented during DNH surveys are: Augusta Co.: George Washington National Forest (SMR); Greenville Co.: 5.5 km SE Bryants Corner (SMR) and Fontaine Creek (KAB and CAP); Isle of Wight Co.:

Cat Ponds (CAP); Lee Co.: Keokee Lake (CSH, sight record); Nottoway Co.: Fort Pickett Military Reservation (CSH); Wise Co.: Pound Reservoir (CSH and DJS, site records); City of Virginia Beach: Fort Story Military Reservation, many records (KAB, DJS, SMR, CSH and David A. Young).

Erythrodiplax minuscula (Rambur). Little Blue Dragonlet

Roble & Hobson (1996) added three counties to the six city and county records listed for Virginia by Carle (1982), and noted that this species is fairly common in the southeastern portion of the state. The Grayson County specimen collected by SMR was taken in a boggy headwater seepage at 4800 feet (1463 m) near the base of Mount Rogers. Additional county records documented by DNH surveys, but not reported by Roble & Hobson (1996) are: Fairfax Co.: Fort Belvoir Military Reservation (CSH, sight record); Greenville Co.: Fontaine Creek (KAB and CAP); Isle of Wight Co.: property adjacent to Blackwater Ecologic Preserve (SMR and KAB); Nottoway Co.: Fort Pickett Military Reservation (CSH); Surry Co.: near Blackwater River 10 km E Waverly (SMR and CSH).

Libellula axilena Westwood. Bar-winged Skimmer

Roble & Hobson (1996) reported this species from Caroline County and remarked that it is fairly widespread in Virginia. Additional new county records (to the ten listed in Carle, 1982) that we have documented are from Accomack (SMR) Augusta (SMR), Bath (SMR), Fairfax (CSH), Isle of Wight (SMR), Scott (SMR) and York (DJS and SMR) counties.

Sympetrum ambiguum (Rambur). Blue-faced Meadowhawk

Roble & Hobson (1996) remarked that this species was more common and widespread in the Coastal Plain of Virginia than suggested by the records in Carle (1982). They alluded to nine additional new city and county records in this physiographic province that were not specifically mentioned in their paper. These records are as follows: Accomack Co. (SMR, CSH and DJS), Fairfax Co. (CSH), Isle of Wight Co. (SMR), King George Co. (KAB), Northampton Co. (SMR), Prince George Co. (SMR), Surry Co. (SMR), York Co. (DJS, KAB, CSH and SMR) and the City of Hampton (CSH). Flint (1996) recently reported this species from Clarke County based on two male specimens collected in a Malaise trap between 29 September and 25 October. Carle (1982) stated that the flight season of *S. ambiguum* in Virginia extends from 4 July to 12 October. Our records range from 24 June to 13 October.

Sympetrum semicinctorum (Say). Band-winged Meadowhawk

Carle (1982) recorded this species from nine counties in western Virginia, ranging as far west as Tazewell County. An adult female was collected by SMR and CSH on 22 September 1993 in Scott County at the site listed above for *Aeshna tuberculifera*

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LITERATURE CITED

- Ahlstedt, S. A. 1991. Reintroduction of the spiny riversnail *Io fluviatilis* (Say, 1825) (Gastropoda: Pleuroceridae) into the North Fork Holston River, southwest Virginia and northeast Tennessee. *American Malacological Bulletin* 8: 139-142.
- Buhlmann, K. A. 1992. A natural heritage inventory for the pygmy snaketail dragonfly (*Ophuogomphus howei*) in the New River, Virginia. Natural Heritage Technical Report 92-31. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 6 pp.
- Carle, F. L. 1980. A new *Lanthus* (Odonata: Gomphidae) from eastern North America with adult and nymphal keys to American octogomphines. *Annals of the Entomological Society of America* 73: 172-179.
- Carle, F. L. 1982. A contribution to the knowledge of the Odonata. Unpublished Ph.D. thesis, Virginia Polytechnic Institute and State University, Blacksburg, Virginia. 1095 pp.
- Carle, F. L. 1983. A new *Zoraena* (Odonata: Cordulegastridae) from eastern North America, with a key to adult Cordulegastridae of America. *Annals of the Entomological Society of America* 76: 61-68.
- Carle, F. L. 1991. Dragonflies. Pp. 197-214 In K. Terwilliger (coord.), *Virginia's Endangered Species*. The McDonald & Woodward Publishing Company, Blacksburg, Virginia.
- Cuyler, R. D. 1984. Range extensions of Odonata in North Carolina, United States. *Notulae Odonatologicae* 2: 55-57.
- Donnelly, T. W. 1994. Some recent records of interest. *Argia* 6(1-2): 13.
- Dragonfly Society of the Americas. 1996. Common names of North American dragonflies and damselflies. Supplement to *Argia* 8(2): 4 pp.
- Dunkle, S. W. 1981. The ecology and behavior of *Tachopteryx thoreyi* (Hagen) (Anisoptera: Petaluridae). *Odonatologica* 10: 189-199.
- Flint, O. S., Jr. 1996. Odonata taken in Malaise traps, with special reference to Virginia. *Banisteria* 8: 37-43.
- Garrison, R. W. 1991. A synonymic list of the New World Odonata. *Argia* 3(2): 1-30.
- Halverson, T. G. 1983. The evolution of dragonfly life histories in heterogeneous environments. Unpublished Ph.D. thesis, University of Maryland, College Park. 158 pp.
- Hoffman, R. L. 1987. Local sites of special concern in Virginia. *Virginia Journal of Science* 38: 399-408.

- Jenkins, R. E., & N. M. Burkhead. 1994. Freshwater Fishes of Virginia. American Fisheries Society, Bethesda, Maryland. 1080 pp.
- Kennedy, J. H., & H. B. White III. 1979. Description of the nymph of *Ophiogomphs howei* (Odonata: Gomphidae). Proceedings of the Entomological Society of Washington 81: 64-69.
- Louton, J. A. 1982. Dragonfly (Anisoptera: Odonata) nymphs of the southeastern United States: identification, distribution and historical biogeography. Unpublished Ph.D. thesis, University of Tennessee, Knoxville. 357 pp.
- Matta, J. F. 1978. An annotated list of the Odonata of southeastern Virginia. Virginia Journal of Science 29: 180-182.
- May, M. L. 1995. The subgenus *Tetragoneuria* (Anisoptera: Corduliidae: *Epitheca*) in New Jersey. Bulletin of American Odonatology 2: 63-74.
- May, M. L., & F. L. Carle. 1996. An annotated list of the Odonata of New Jersey, with an appendix on nomenclature in the genus *Gomphus*. Bulletin of American Odonatology 4: 1-35.
- Needham, J. G., & M. J. Westfall, Jr. 1955. A Manual of the Dragonflies of North America (Anisoptera), including the Greater Antilles and the Provinces of the Mexican Border. University of California Press, Berkeley. 615 pp.
- Opler, P. A. 1979. Freshwater and terrestrial insects. Pp. 171-183 In D. W. Linzey (ed.), Proceedings of the Symposium on Endangered and Threatened Plants and Animals of Virginia. Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- Roble, S. M. 1994. A preliminary checklist of the damselflies of Virginia, with notes on distribution and seasonality (Odonata: Zygoptera). Banisteria 4: 3-23.
- Roble, S. M. 1995. First record of *Miathyria marcella* in Virginia. Argia 7(2): 4-6.
- Roble, S. M. 1996. Natural Heritage Resources of Virginia: Rare Animal Species. Natural Heritage Technical Report 96-11. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 23 pp. plus appendices.
- Roble, S. M., & C. S. Hobson. 1996. The Odonata of Fort A. P. Hill and vicinity, Caroline County, Virginia. Banisteria 7: 11-40.
- Roble, S. M., & D. J. Stevenson. 1996. First records of *Telebasis byersi* from Virginia, including a new northern range limit. Argia 8(1): 13-14.
- Silverman, B. 1997. Coal spill threatens Powell River. Virginia Chapter News (The Nature Conservancy), Spring 1997: 5.
- Stevenson, D. J., S. M. Roble, & C. S. Hobson. 1995. New records of the damselfly *Ischnura prognata* in Virginia. Banisteria 6: 26-27.
- Tennessee, K. J., J. D. Harper, & R. S. Krotzer. 1995. The distribution of Odonata in Alabama. Bulletin of American Odonatology 3: 49-74.
- Terwilliger, K., & J. R. Tate. 1995. A Guide to Endangered and Threatened Species in Virginia. The McDonald & Woodward Publishing Company, Blacksburg, Virginia. 220 pp.
- White, T. R., K. J. Tennessee, R. C. Fox, & P. H. Carlson. 1980. The aquatic insects of South Carolina. Part I: Anisoptera (Odonata). South Carolina Agricultural Experiment Station Bulletin 632: 1-153.
- Wolcott, L. T., & R. J. Neves. 1994. Survey of the freshwater mussel fauna of the Powell River, Virginia. Banisteria 3: 3-14.